

What is claimed is:

1. A microstructured optical fiber component comprising
a first internal portion exhibiting a first refractive index;
a plurality of regions exhibiting various, predetermined refractive indices, the
5 plurality of regions arranged to provide predetermined modifications to an optical signal
passing therethrough

CHARACTERIZED IN THAT

- the microstructured optical fiber component is formed to comprise a fiber
segment by drawing from a preform of similar pattern and is defined by a pair of
10 endfaces with a height such that the endfaces do not significantly affect the behavior of
the light passing therethrough in a direction parallel to the endfaces.

2. The microstructured optical fiber of claim 1 wherein the fiber segment
comprises at least one aperture formed through the vertical extent thereof, said at least
one aperture filled with a gas, liquid or solid.
- 15 3. The microstructured optical fiber of claim 2 wherein one or more optical
elements are disposed within the at least one cylindrical aperture.
4. The microstructured optical fiber of claim 3 wherein a plurality of solid plugs
is disposed within at least one aperture.
5. The microstructured optical fiber of claim 3 wherein one or more micro-fluidic
20 plugs of material with a known refractive index is inserted in at least one aperture.
6. The microstructured optical fiber of claim 1 wherein one or more
microstructures are formed through at least a portion of the vertical extent of the fiber
segment.
7. The microstructured optical fiber of claim 6 wherein at least microstructure
25 comprises a plurality of etched cylindrical elements formed to be parallel to the endfaces
of the component.
8. The microstructured optical fiber of claim 1 wherein the sidewalls of the fiber
segment are tapered from the center region toward the endfaces to alter the lateral
behavior of an optical signal passing therethrough.
- 30 9. A method of forming a microstructured optical fiber component, the method
comprising the steps of:

a) providing an optical fiber preform, said preform composed of a material exhibiting a first refractive index and including one or more internal structural areas exhibiting various, predetermined refractive indices;

5 b) heating and drawing said optical fiber preform to reduce the physical dimensions of said preform, said drawing performed for a time period sufficient to reduce the outer diameter of said preform;

c) slicing the drawn optical fiber of step b) into fiber segments, each segment used as a microstructured optical fiber component.

10 10. The method as defined in claim 9 wherein in performing step c), the fiber is sliced into segments having a height h in the range of a few microns to several meters

11. The method as defined in claim 9 wherein the method further comprises the step of polishing the sidewalls of the preform or fiber segment to form a rectangular component.

15 12. The method as defined in claim 11, wherein the method forms a complex microstructured optical component by performing the additional steps of:

disposing a plurality of polished rectangular components in a predetermined arrangement;

heating and drawing said arranged plurality of rectangular components for a predetermined time to reduce the outer dimension of the arrangement; and

20 slicing the drawn structure to form a complex-structured microstructure optical component.